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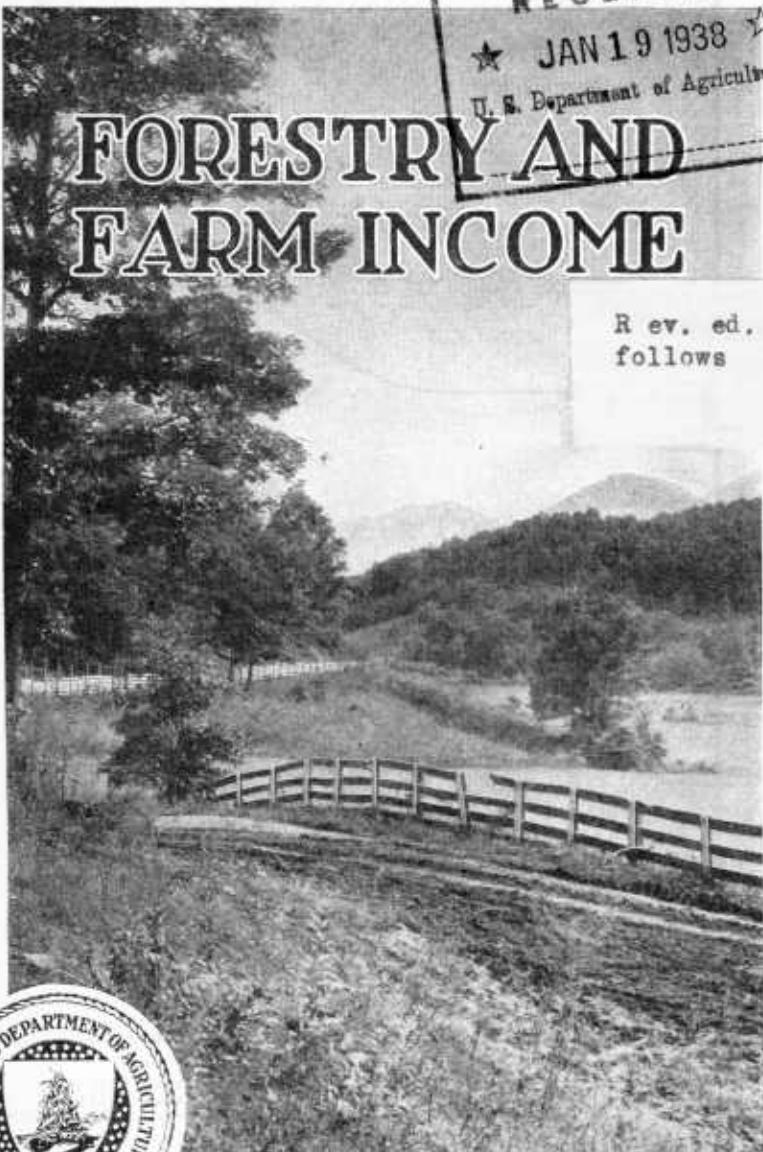
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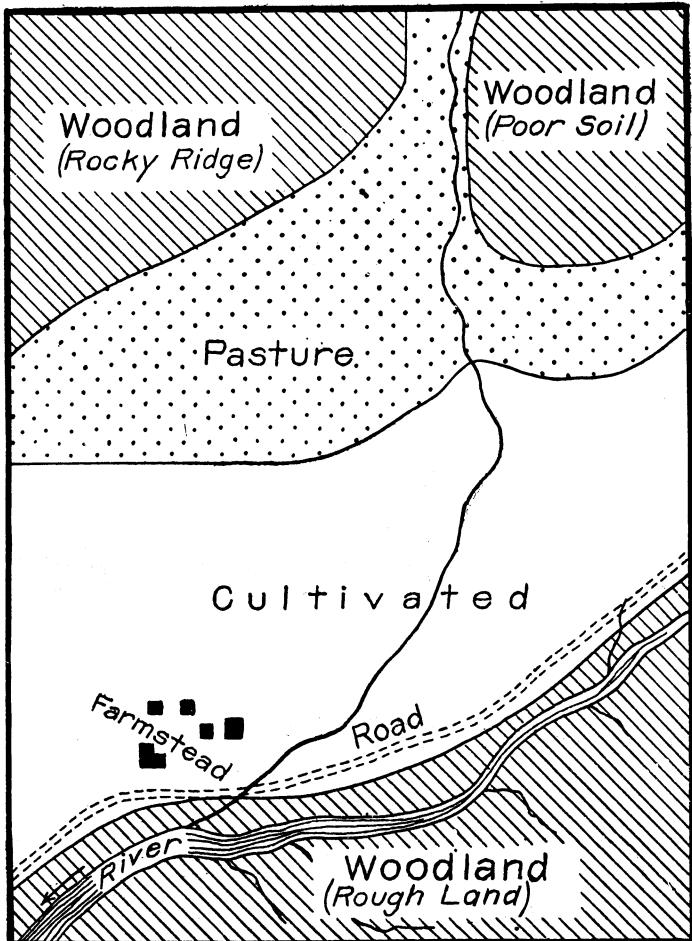
U. S. Department of Agriculture

FORESTRY AND FARM INCOME

Rev. ed.
follows



NO IDLE LAND ON THE FARM



Woodland on the hills, pasture land on the slopes,
and cultivated land below

Washington, D.C.

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Slightly revised October 1937

FORESTRY AND FARM INCOME

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WHY FARM FORESTRY PAYS

THE RIGHT HANDLING of forest trees on the farm will make it more prosperous, add to its comforts as a home, and enhance its value as an investment.

The home forest, in many sections of the country, will supply the timber which the farm needs for buildings, fences, fuel, repairs of all kinds, and many other uses; and there will often be a surplus which can be sold in the form of standing timber, saw logs, posts, poles, crossties, pulpwood, fuelwood, and blocks or billets for making spokes, handles, spools, boxes, barrels, and excelsior.

A well-cared-for home forest serves also as a windbreak for buildings, a shelter for livestock, a protection of valuable lands from erosion, a means of profitable employment for men and teams during otherwise spare or idle time, a place of recreation, and an improvement in the appearance of the farm.

Trees improve and build up the soil. The leaves, small twigs, and other tree litter decompose and form a layer of dark-colored vegetable mold, which enriches the soil and stores up soil moisture. By means of this layer of mold, the binding of the soil by the roots of the trees, and the resistance of the trunks to the rapid flow of water, the woods prevent floods from gullying or destroying the land by erosion, particularly on steep slopes.

Even if a farmer sells no timber the woodland pays. The firewood, fence posts, and material for repair and construction on the farm, the time and money saved by having them conveniently on hand, and the protection against extremes of weather afforded the crops, farm buildings, and stock are worth considerably more than the trouble and expense of raising and caring for the trees.

The woods need not occupy good farm land that will grow other crops. Trees are, as a rule, grown on the less fertile, stony, thin, or poorly-drained soils and on steep slopes. Unused corners and

small uncultivated spots about the farm are good places for rapid-growing, useful trees. The chief economic reason for timber growing on the farm is to get a money return from those portions which would otherwise be unproductive.

Though the land on which the farm forest is situated may not be suitable for other crops, it should not be treated as waste land (fig. 1). By comparatively little care it can be made to produce timber of value. Only a little attention is required, and this may be given in the winter or when other farm work is slack. Many trees that used to have slight value, and even small trees that used to be counted as brush to be got rid of, are now generally used for commercial purposes.

A permanent woodland is an essential part of a well-equipped farm; and more than ever before farm woodland has become a valuable asset convertible into money.

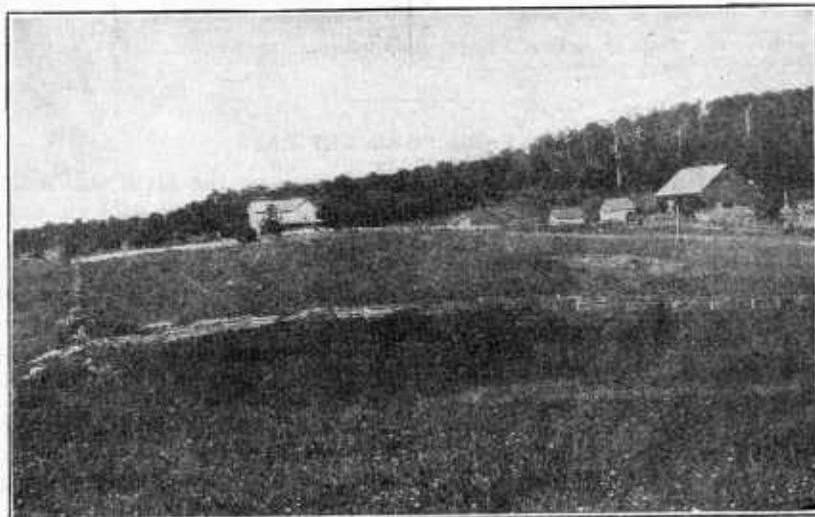


FIGURE 1.—Timber for the farm and for market, and shelter for the farmstead from woodland covering a stony ridge.

EXTENT OF FARM WOODLANDS

About one third of all the forest land of the United States is on farms. According to the 1935 census figures (table 1), this means that the farm woodlands amounted in all to about 185,000,000 acres. This is equivalent, roughly, to the aggregate area of New York, New Jersey, Pennsylvania, Maryland, Delaware, Virginia, Ohio, Illinois, and Kentucky. If placed contiguously, they would form a solid strip 100 miles in width reaching from New York to a point one third the way across California.

The total woodland on farms east of the Rocky Mountains (fig. 2) amounts to 133,000,000 acres, or 89 percent of the total in the country. It covers an area as large as the entire forest lands of nearly all central and western Europe, including France, Germany, Switzerland, Austria, Denmark, Belgium, Netherlands, Poland, Czechoslovakia, Spain, Portugal, and Italy.

TABLE 1.—*Farm-woodland information, by regions and States, January 1935*

Region and State	Farm woodland area ¹	Farms ¹	Average woodland per farm (basis: all farms) ¹	Total land in farms ¹	Portion of farm in woodland ²	Portion of forest land in State in farm woodland ¹	Increase in farm woodland last 5 years; ¹ 1935 over 1930	Value of all farm-timber products in 1929 ²
	Acres	Number	Acres	Acres	Percent	Percent	Acres	Dollars
New England:								
Maine	2,427,638	41,907	58	4,721,842	51.4	16.7	186,728	7,913,650
New Hampshire	1,273,826	17,695	72	2,115,548	60.2	28.3	201,826	3,063,363
Vermont	1,671,046	27,061	62	4,042,658	41.3	50.9	167,365	4,905,080
Massachusetts	1,027,724	35,094	29	2,195,714	46.8	31.4	165,155	2,981,126
Rhode Island	148,541	4,327	34	307,725	48.3	53.1	26,952	330,776
Connecticut	990,150	32,157	31	2,079,933	47.6	62.3	390,745	1,688,410
Middle Atlantic:								
New York	4,022,490	177,025	23	18,685,741	21.5	33.5	388,251	16,259,744
New Jersey	355,702	29,375	12	1,914,110	18.6	17.8	76,810	735,277
Pennsylvania	3,665,540	191,284	19	15,855,343	23.1	27.7	302,225	7,679,546
East North Central:								
Ohio	3,158,882	255,146	12	22,857,692	13.8	67.7	385,253	5,740,367
Indiana	3,064,187	200,835	15	20,518,745	14.9	88.4	444,707	5,375,846
Illinois	3,122,783	231,312	14	31,661,205	9.9	96.9	381,027	4,557,100
Michigan	3,816,124	196,517	19	18,459,922	20.7	18.6	581,386	8,801,817
Wisconsin	6,511,767	199,877	33	23,459,203	27.8	37.4	806,375	16,925,577
West North Central:								
Minnesota	5,383,250	203,302	26	32,817,911	16.4	24.6	636,947	10,756,988
Iowa	2,312,244	221,986	10	34,359,152	6.7	97.8	98,740	5,225,950
Missouri	8,902,997	278,454	32	35,054,542	25.4	50.6	1,202,997	11,850,371
North Dakota	575,435	84,606	7	39,118,136	1.5	99.0	17,693	486,550
South Dakota	635,709	83,303	8	37,101,871	1.7	32.9	145,152	544,705
Nebraska	934,237	133,616	7	46,615,762	2.0	85.6	-5,982	1,408,528
Kansas	1,283,036	174,589	7	48,009,770	2.6	98.0	123,530	2,306,529
South Atlantic:								
Delaware	234,511	10,381	23	921,251	25.5	72.2	30,813	419,876
Maryland	1,263,948	44,412	28	4,383,641	28.8	56.9	50,845	2,270,018
Dist. of Columbia	417	89	5	2,801	14.9	-	-62	449
Virginia	7,670,354	197,632	39	17,644,898	43.5	50.7	975,198	12,028,661
West Virginia	3,570,151	104,747	34	9,423,655	37.9	35.9	441,601	4,070,330
North Carolina	10,094,743	300,967	34	19,936,307	50.6	47.9	1,768,309	15,184,145
South Carolina	5,690,873	165,504	34	12,329,958	46.2	45.0	1,788,338	3,824,378
Georgia	11,675,369	250,544	47	25,296,522	46.2	50.7	3,302,432	8,861,877
Florida	2,611,295	72,857	36	6,048,406	43.2	11.1	719,457	1,262,546
East South Central:								
Kentucky	5,421,246	278,298	19	20,608,510	26.2	51.5	624,620	6,662,901
Tennessee	6,206,217	273,783	23	19,085,837	32.5	43.6	792,870	13,021,166
Alabama	8,247,231	273,455	30	19,660,828	41.9	38.0	1,761,250	8,504,708
Mississippi	7,562,659	311,683	24	19,655,413	38.5	40.7	1,338,350	9,280,785
West South Central:								
Arkansas	6,527,463	253,013	26	17,741,627	36.8	29.5	1,084,211	7,769,391
Louisiana	3,427,431	170,216	20	10,444,288	32.8	18.0	768,318	3,231,438
Oklahoma	4,846,755	213,325	23	35,334,870	13.7	41.0	787,262	2,829,834
Texas	25,135,727	501,017	50	137,597,389	18.3	89.2	9,446,244	8,440,281
Mountain:								
Montana	1,773,877	50,564	35	47,511,868	3.7	8.6	-46,029	964,202
Idaho	951,281	45,113	21	9,951,661	9.6	4.2	91,373	938,979
Wyoming	595,015	17,487	34	28,161,911	2.1	7.1	80,372	279,396
Colorado	1,759,005	63,644	28	29,978,472	5.9	8.6	217,542	524,553
New Mexico	2,131,666	41,369	52	34,397,205	6.2	10.9	213,532	403,432
Arizona	1,123,684	18,824	60	14,018,540	8.0	10.9	213,532	382,006
Utah	219,857	30,695	7	6,239,318	3.5	2.6	28,521	35,749
Nevada	89,254	3,693	24	3,621,769	2.5	.8	22,881	53,056
Pacific:								
Washington	2,354,168	84,381	28	14,680,097	16.0	10.6	479,928	3,262,215
Oregon	3,349,944	64,826	52	17,357,549	19.3	11.1	227,729	3,908,087
California	5,706,513	150,360	38	30,437,995	18.8	19.8	1,203,758	2,090,485
Total or average	185,474,935	6,812,350	27	1,054,515,111	17.59	30.07	35,530,240	242,042,245

¹ 1935 census.² 1930 census was the last to give these values.

The average acreage of woodland on farms in the United States is about 27 per farm. This amount varies widely, however, in the different sections of the country, ranging from 48 acres in New England to 17 in the West North Central States (table 2).

Farms contain more than one half the entire hardwood forest lands of the United States. On the farms of this country the woods occupy a larger portion of the total land area than any other crop; in fact as much as all the cereal crops combined.

In the New England States more than 20 percent of all forested lands is on farms, and in Ohio, Indiana, Illinois, and Iowa from 70 to 97 percent. In the Southern States the farms contain almost one half of all the forest lands, or a total of more than 110,000,000 acres. In Maryland, Virginia, Georgia, Kentucky, and Texas more than 50 out of every 100 acres of forest land is on farms.

Information concerning the areas of farm woodland, percentages of farmland wooded, total number of farms, and other subjects will be found by States in table 1 and by regions in table 2.



FIGURE 2.—Important farm woodland area east of the Rocky Mountains.

TABLE 2.—*Farm-woodland information by regions*

Region	Total wood- land on farms	Average wood- land on farms (basis: all farms)	Portion of farm in wood- land	Farms	Total land in farms
New England (Maine, N. H., Vt., Mass., R. I., Conn.)-----	7,538,925	48	48.8	158,241	15,463,420
Middle Atlantic (N. Y., N. J., Pa.)-----	8,043,732	20	22.1	397,684	36,455,194
East North Central (Ohio, Ind., Ill., Mich., Wis.)-----	19,673,743	18	16.8	1,083,687	116,956,767
West North Central (Minn., Iowa, Mo., N. Dak., S. Dak., Nebr., Kans.)-----	19,976,908	17	7.3	1,179,856	273,077,144
South Atlantic (Del., Md., D. C., Va., W. Va., N. C., S. C., Ga., Fla.)-----	42,811,661	37	44.6	1,147,133	95,987,439
East South Central (Ky., Tenn., Ala., Miss.)-----	27,437,353	24	34.7	1,137,219	79,100,588
West South Central (Ark., La., Okla., Tex.)-----	39,937,379	35	19.9	1,137,571	201,118,174
Mountain (Mont., Idaho, Wyo., Colo., N. Mex., Ariz., Utah, Nev.)-----	8,644,639	32	5.0	271,392	173,880,744
Pacific (Wash., Oreg., Calif.)-----	11,410,625	38	18.3	299,567	62,475,641
Total or average-----	185,474,965	27	17.50	6,812,350	1,054,515,111

VALUE OF WOODLAND PRODUCTS

Considerable income may be derived from the home forest. The total value of forest products taken from timbered land on farms reported in the 1930 census, and shown in table 3, was \$242,042,245.¹ Over half of this represents the value of wood and various minor wood products used on the farm and the rest the value of the products sold, or cut and held for sale. For the farms reporting (2,558, 899, or 40.7 percent of all the farms), this amounted to an average of about \$95 per farm.

The value of the various forest products cut yearly on farms in New England amounted to nearly \$21,000,000. The same item for the 14 Southern States from Maryland to Oklahoma and Texas makes a total yearly value of over \$105,000,000. Each of 7 States reported more than \$10,000,000 as the value of forest products cut on their farms, as follows, beginning with the highest: Wisconsin (\$16,925,577), New York (\$16,259,744), North Carolina (\$15,184,145), Tennessee (\$13,021,166), Virginia (\$12,028,661), Missouri (\$11,850,371), and Minnesota (\$10,756,988). They were followed by Mississippi, Georgia, Michigan, Alabama, Texas, Maine, and Pennsylvania, each of which cut forest products worth more than \$7,000,000.

Saw logs and veneer logs, crossties, poles and piling, fence posts, pulpwood, and fuel wood are the chief timber products cut on farms (table 3). Nearly 41 (40.7) farms out of every 100 in 1929 (according to the 1930 census) cut some timber products. Fuel wood is an important item. In 1929 an average of 14 cords was cut per farm reporting, or a total for the country of 34,100,529 cords. Piled continuously, this would reach twice around the world at the equator

TIMBER GROWING IN THE EASTERN PART OF THE UNITED STATES PAYS BECAUSE—

1. There is plenty of cheap land unfit for agriculture.
2. The abundant rainfall permits rapid tree growth.
3. Transportation facilities by rail and water are good.
4. Numerous large cities furnish a market.
5. The region is far removed from the virgin supplies of the Pacific Northwest.

¹ The latest census values. These items were not included in the 1935 census.

and overlap for a distance of 1,600 miles. The total value was \$151,245,458. Fence posts are essential on the farm, and the farmers cut 98,664,249, or an average of 174 per farm. The saw logs and veneer logs cut on farms in 1929 amounted to a total of 5,000,000,000 board feet. The value of this material at the farm was \$47,637,752. Farms produce relatively smaller amounts of saw timber and more of the total cut of fuel wood, posts, crossties, and pulpwood.

TABLE 3.—*Quantities of various timber products cut on farms and their total values, by regions¹*

Region	Kind of timber product						Value of all products
	Saw logs and veneer logs	Fuel wood	Pulp- wood	Posts	Cross- ties	Poles and piling	
New England ²	<i>Board feet</i>	<i>Cords</i>	<i>Cords</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Dollars</i>
409,252,000	1,534,323	286,889	1,468,516	341,349	73,604	20,882,405	
Middle Atlantic ²	255,585,000	2,771,188	79,522	9,382,626	911,863	406,226	24,674,567
East North Central ²	375,540,000	5,211,268	209,153	16,731,088	1,504,810	233,578	41,400,707
West North Central ²	260,909,000	4,557,450	163,700	25,263,432	1,564,757	236,253	32,579,621
South Atlantic ²	1,579,573,000	7,881,673	398,631	8,512,614	2,961,920	986,297	49,922,280
East South Central ²	1,409,725,000	6,241,856	161,882	12,571,457	3,634,212	549,763	37,649,560
West South Central ²	359,713,000	4,356,687	124,324	19,579,414	3,842,006	348,494	22,270,944
Mountain ²	59,784,000	406,370	7,253	2,428,843	234,501	244,314	3,581,373
Pacific ²	332,845,000	1,149,714	54,405	2,726,259	343,368	219,881	9,260,788
Total quantity	5,042,926,000	34,110,529	1,485,759	98,664,249	15,338,786	3,298,415	
Total value—dollars	47,637,752	151,245,458	11,364,389	15,316,161	10,000,642	6,477,843	242,042,245

¹ Values by States are shown in table 1.

² For names of States included, see table 2.

Census of 1930.

SECURING GOOD FOREST GROWTH

At present farm woodlands are yielding, as a rule, only from one third to one half the wood they could grow. This is because only a few farmers realize the possibilities in their woodlands and give them proper care. As a result the home forest, which is close at hand, where comparatively little attention each year in protecting, cutting, and utilizing the timber would be very profitable, is in poor condition.

The amount of timber that an acre can grow in a year varies a good deal with the quality of the soil and moisture supply and the kind and number of the trees per acre. If fully stocked with trees and well cared for, an acre of hardwoods should grow yearly from about one half to one cord of wood and an acre of pine from one to two cords, a cord being equivalent to about 500 board feet of saw timber. Growth averages rather less in the northern part of the country because of the shorter season and somewhat more in the warmer southern part.

The chief essentials in keeping the trees growing are excluding fires and allowing the humus to collect on the forest floor. Large openings in the woods reduce the annual yield of timber and should not be allowed to occur. The length of time required to reach merchantable size varies with the kind of tree and the use to which its wood is to be put. Posts and crossties of some kinds may be grown in from 10 to 30 years, and most kinds of quick-growing trees will be large enough for saw timber in from 20 to 40 years.

After logging, a new stand of young trees generally starts naturally from seeds or sprouts from stumps. The natural seeding process in the woods can be helped by turning hogs into the woodland before the seed falls, or by harrowing the ground or conducting logging operations in a good seed year just previous to or shortly after

WOOD INSURES WINTER JOB



A farmer, settling on a quarter section of cut-over timberland in northern Wisconsin, reserved 70 acres for permanent woodland and cleared the rest. The natural timber was pine, spruce, and fir. After a few years he began cutting timber carefully, always leaving the thriftiest and best to grow. This was winter work for him and his sons.

During a period of 31 years he has kept a record of the amount of timber cut and the money received for it. The timber cut has amounted to 700,000 board feet of saw logs, which has brought him in an average gross return of \$500 in cash yearly. Yet by his good management and cutting, the land at the end of the period (1932) has about 275,000 feet of standing timber.

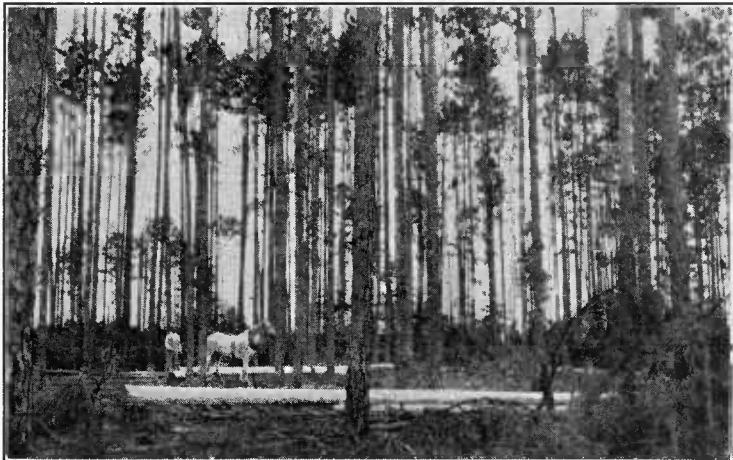
The owner, in speaking of his forestry operations, admits that his woods have often been a source of temptation to him. "Many times in those earlier years", he said, "when cash was needed badly I was tempted to sell all the timber in one lump. But I did not do it. I knew that if I held on to my timber there would always be a winter job and some cash coming in. I am glad today that I never let it go."

the seed falls. By these means, the soil is stirred up, the seeds come in contact with it, and germinate more readily.

Some points to be remembered about trees which sprout are (1) the most thrifty sprouts come from clean, well-cut stumps felled during the late fall, winter, or very early spring before the sap begins to flow; and (2) the top of the stump should be cut smooth

so as to shed water. Trees which sprout successfully include such hardwoods as the oaks, hickories, chestnut, basswood, gums, cottonwood, and willows, and young shortleaf and pitch pines.

PINE POLES FROM AN OLD POTATO PATCH



A young man from Nebraska moved on to a small, poor, sandy-land farm in southern Mississippi. Two acres of abandoned land, worn out in growing potatoes and watermelons, came up in longleaf pine saplings. This "brush", as the neighbors called such patches, meant more to this young farmer from the treeless plains than to the local residents, and he protected the young trees from fire. Later when the neighbors, in a friendly spirit, advised him to cut and burn his saplings in order to avoid the State tax on growing timber he refused to take their advice.

The young trees grew rapidly under protection, and the land became covered with a crowded stand of tall, straight poles. One day a timber buyer came along the sandy road. He looked over the stand, which he found contained more than 1,000 merchantable poles, and offered the owner \$600 for the standing trees. This was more "cash money" than the farmer had seen at one time in many years, and he gladly closed the deal at the buyer's figure, although at current stumpage prices the timber was worth considerably more money.

With no expense for labor or fertilizer, the farmer's timber crop yielded him a good net profit averaging \$5 an acre yearly for a period of 35 years.

Woodlands may also be restocked with young trees by planting out small seedlings grown in nursery beds or dug up in the woods, or under some conditions by sowing the tree seeds. If trees are

to be planted, it is well to select those native to the region which grow most rapidly and produce the most useful kinds of wood (fig. 3).

NUMBER OF TREES IN GOOD NATURAL STANDS

Often the question is raised as to how many trees there should be in a well-stocked natural stand, namely, one that is not too dense or too open. The number varies with the prevailing sizes or diameters of the trees and also with the kind, or species, of tree. Table



FIGURE 3.—Thrifty woods, good crops, and a happy farmer.

4, for example, shows the number of trees of different diameters and the total number of trees per acre for stands of four different groups or ranges of tree diameters. This holds generally good for natural stands of a good number of different kinds of trees in the eastern part of the United States. Those which demand much light, or are intolerant, such as the ash, black walnut, and red pine, must have an abundance of light and usually consume more soil moisture, and there should be somewhat fewer trees of these kinds per acre. Likewise trees such as the sugar maple, beech, yellow birch, and white pine, which can tolerate considerable shade, might stand closer together.

IMPROVING THE WOODS BY CUTTING

When rightly handled, a stand of timber yields continuous or repeated harvests. It should be cut with an eye to its continuous production on the land. The aim should be to keep the land producing timber of the best quality at the fastest rate.

TABLE 4.—*Number of trees per acre of different sizes in well-stocked stands¹*

Trees of like size		Number of trees of diameter—			
Diameter at breast height ² (inches)	Number	2 to 10 inches	2 to 14 inches	6 to 18 inches	10 to 24 inches
2	2,000	400	300	-----	-----
4	900	180	130	-----	-----
6	510	105	75	75	-----
8	320	65	45	45	-----
10	235	50	30	30	30
12	170	-----	25	25	20
14	130	-----	20	20	16
16	100	-----	-----	15	12
18	85	-----	-----	12	11
20	75	-----	-----	-----	9
22	65	-----	-----	-----	8
24	55	-----	-----	-----	7
Total		800	625	222	113

¹Based on data compiled by the University of Michigan.

²Height of 4½ feet above the ground. Trees measured outside the bark.

Not all that is merchantable should be cut. In timber production on farms, it is not sufficient to leave only enough seed trees to restock the land. This would mean too long a wait between harvests.

TREES TO CUT FOR IMPROVING THE WOODS

Trees which are well suited for firewood and the removal of which will lead to an improvement of the remaining trees in the stand.

Trees which have been overtopped by others and have had their growth stunted.

Diseased trees, or trees seriously injured by insect attacks, or trees extremely liable to such injury; for example, chestnut in the region subject to blight or birch in the gipsy-moth area.

Badly fire-scarred trees.

Trees of the less valuable species, such as beech, birch, black oak, blackjack oak, or black gum, crowding the more valuable sugar maple, white or shortleaf pines, yellow poplar, or white oak.

Crooked trees and large-crowned, short-boled trees that will not make good lumber and that are crowding or overtopping others.

Slow-growing trees crowding fast-growing species of equal value.

Sound dead trees, both standing and down.

Mature trees that have reached their full growth.

There should always be plenty of younger trees as a good basis for growing later crops and also trees of larger sizes that can be cut at frequent intervals and keep up the cash income from timber.

Good management should result in a home forest fully stocked with sound, well-shaped trees of valuable and useful kinds that are growing as fast as possible. This can be brought about largely by "weeding," or cutting out the inferior kinds—the "weed" trees—for exactly the same reason that weeds are hoed out of the cornfield. The good trees need the light, space, soil moisture, and plant food that would otherwise be taken by the less valuable trees. Sometimes it becomes advisable to fill openings or improve the quality of the woods by planting seeds or seedlings of desirable kinds of trees.



FIGURE 4.—Woods improved by right cutting.

Dead and dying trees, diseased trees, deformed trees which shade out better ones, the less valuable kinds of trees, such as gray birch, aspen, blackjack oak, dogwood, sourwood, blue beech, ironwood, and others, and the less promising trees in crowded groups should be removed. The last operation is known as "thinning." By following these practices each year improvement in the forest is brought about in a relatively short time.

The wood removed in improvement cuttings often need not be a loss. It should be considered as an early crop that can be used or sold, generally at a price to show a profit on the work of thinning, while the woods are made more valuable by its removal (figs. 4, 5, and 6).

It is sometimes advisable to prune trees in forest stands, more especially in immature or younger stands of the more valuable kinds or in thrifty promising stands of any sort. The purpose is to clean the trunk of side branches, causing it to develop clear, high-grade

timber which commands higher prices. Such forest pruning began to be practiced first in New England with stands of white pine, where it has proved to be generally profitable. It is coming into good practice with farmers and other small owners in the Southern States on shortleaf, loblolly, slash, and longleaf pine; also on black

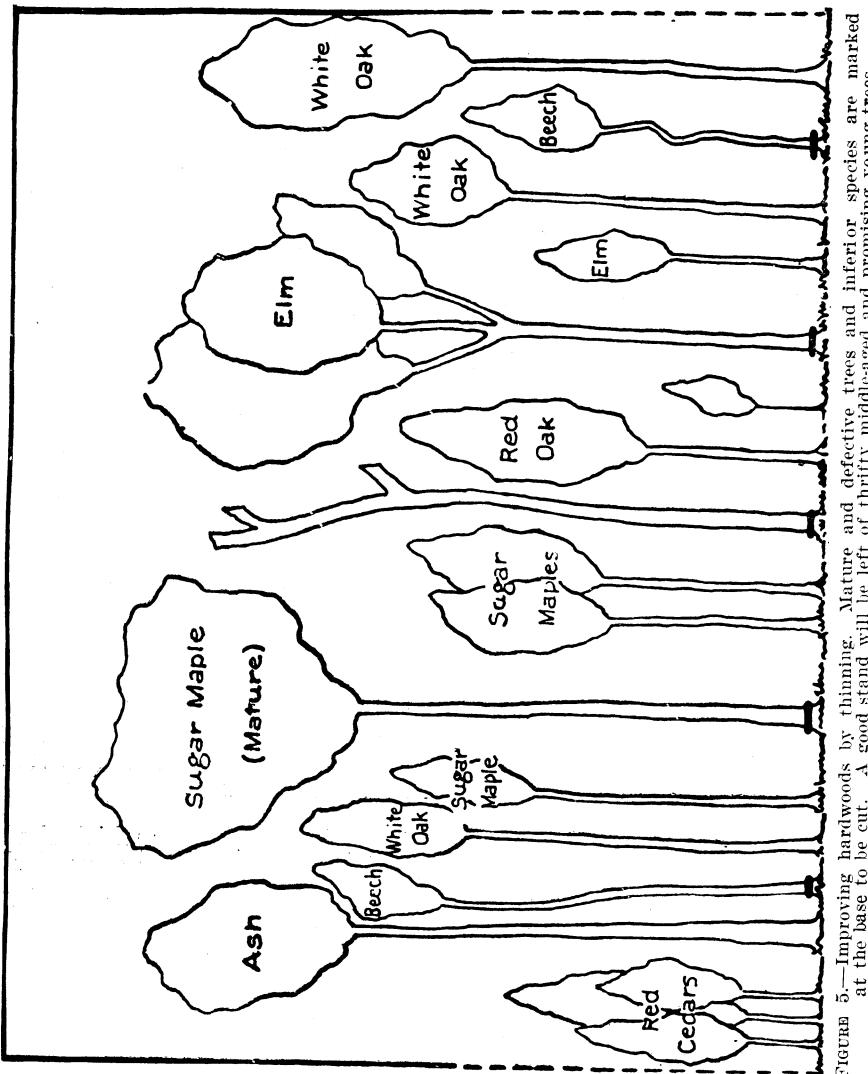


FIGURE 5.—Improving hardwoods by thinning. Mature and defective trees and inferior species are marked at the base to be cut. A good stand will be left of thrifty, undiseased and promising young trees.

walnut, black locust, pine, and spruce forest plantations in the Central and Lake States.

Much more often than is commonly realized, grapevines and some other kinds of vines kill or stunt valuable trees, especially those that have rather open foliage like the black walnut, ashes, and locusts, and also trees standing in the open. The damage is caused by the

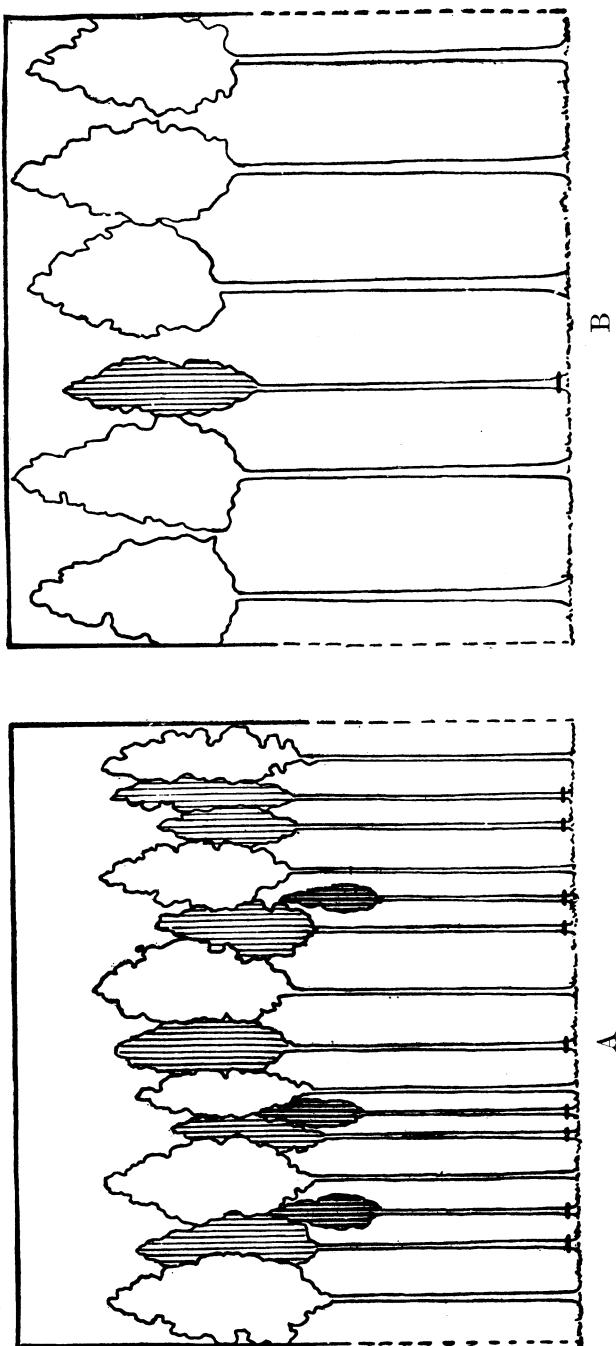


FIGURE 6.—The growth and value of pine are increased by repeated thinning. The trees removed can generally be used or sold profitably for firewood, treated fence posts, or small timber : A, before thinning—15 overcrowded trees (shaded trees to be cut) ; B, the same stand 5 years later, after thinning—6 larger and more valuable trees (shaded tree to be cut).

vines spreading their leaves above those of the tree, which are thus shaded out, and as a result the tree becomes sickly or dies. This is an insidious form of damage, which often escapes notice. Therefore, cutting the vines should not be overlooked or neglected.

GOOD LOGGING

The right use of the ax and saw and the protection of the land from fire are the keys to the growing of timber profitably and perpetually as a crop. This right use comes from good judgment in the selection of trees to be cut and in cutting and logging carefully. Lack of proper care in these two essentials of protection and cutting has resulted in the ruin of many pieces of valuable timber-producing land.

The trees to be cut should each be selected in advance and marked, preferably by the use of whitewash or a cheap white paint. Blazing the trunks with an ax causes wounds in trees, which sometimes are left standing for long periods before being cut. Mistakes made in marking trees with an ax are not so easily remedied as those made with a brush.

Cutting should be done so as to cause the least possible injury or destruction to other living trees, particularly young trees. In felling trees advantage should always be taken of natural openings in the woods.

Stumps should be cut low—12 inches or less in height—thus taking the best timber, which is usually in the base of the tree. Cases are known in which enough good-grade timber has been left in high stumps to have paid for the entire cost of the logging.

Logs should be cut well into the tops of the trees. The upper log or logs usually will yield only low-grade lumber, but it should be utilized.

Advantage should be taken of crooks to cut the ends of logs at crooks rather than between them.

All brush should be pulled away from living trees in logging to lessen the fire damage and, in southern pines, also the menace of infestation of beetles, or so-called "worms." Care against the outbreak and spread of fire is of extreme importance.

In getting logs out of the woods care should be used to avoid all unnecessary injury or damage to living trees, both young growth and mature trees. The healing of wounds is a slow process, and wounds in the bark are often serious as they freely admit infection of disease and the attack of insects.

ESTIMATING AND SELLING TIMBER

When timber is no longer growing at a profitable rate it should be cut and used or sold. A farmer who is ready to sell timber would profit by measuring his trees, estimating how much saw timber or other product they contain, and making inquiry to find out how much they are worth. If he does not know or cannot find out how to do this, he should employ some experienced and reliable person to estimate and value his timber for him.

The customary units of measure in selling farm timber are board feet, cords, linear feet, and the piece. A board foot, for example,

is 12 inches long, 12 inches wide, and 1 inch thick, or its equivalent. The standard cord of wood is 4 feet high, 4 feet wide, and 8 feet long. The linear foot is a measure of length only, without regard to the other dimensions of the material. Piece measure is only a count of the pieces in any form in which the wood is sold.



FIGURE 7.—Fast-growing hickory is in demand for implement handles and spokes.

Logs and standing trees are usually estimated in board feet. Saw timber is measured in board feet. Round timber, such as poles and piling, is usually sold by the linear foot. Firewood, pulpwood, and wood cut in short lengths for distillation, handle stock (fig. 7), and other uses are usually sold by the cord. Fence posts, ties, telephone poles, and some other forms of timber are sold by the piece.

Saw timber in the standing tree is estimated by measuring the diameter of the tree, outside the bark, at breast height ($4\frac{1}{2}$ feet above the ground), and measuring or estimating the height of the tree. When these measurements are known, the contents of the tree can be found from a volume table.¹ Often the length of the part of the trunk to be used is taken in units, or number of 16-foot logs, instead of the total height of the tree.

A volume table is one showing in board feet the amount of timber that can be sawed from trees of given heights and diameters or from a given number of merchantable logs and diameters. For example, a volume table for white oak would show that a tree 18 inches in diameter (measured outside the bark at breast height) and having three merchantable 16-foot logs will saw out 286 board feet of lumber. Volume tables are made for different kinds of trees, each table based on the average of many measures of felled trees.

¹ For volume tables and other information on estimating and measuring timber, see Farmers' Bulletin 1210, Measuring and Marketing Farm Timber, or apply to State foresters. Price 10 cents.

TEN HELPS IN MARKETING WOODLAND PRODUCTS

1. Get a reliable estimate of the amount and value of the timber to be sold. If necessary get experienced help. Know what you want to sell.
2. Before selling, consult neighbors who have sold timber, and benefit from their experiences.
3. Investigate local timber requirements and prices. Your products may be worth more locally because transportation is saved.
4. Get prices for various wood products from as many sawmills and other wood-using plants as possible.
5. Advertise in papers and otherwise secure outside competition.
6. Secure bids, if practicable, both by the lump and by log-scale or other unit measure.
7. Be sure that you are selling to responsible purchasers.
8. Market the higher grades of timber and use the cheaper for farm purposes.
9. Remember that standing timber can wait over a period of low prices without rapid deterioration.
10. Use a written agreement in selling timber, especially if the cutting is to be done by the purchaser.

A saw log is measured by taking the length of the log and its diameter inside the bark at the small end, then employing a log rule to estimate the amount or number of board feet it contains. A log rule is a statement of the estimated number of board feet of lumber that can be sawed from logs of different lengths and sizes. A good rule for 12-foot logs is to multiply the diameter inside bark at the small end by half the diameter. For shorter logs the contents will be proportional to the length of the logs. Thus, a 12-foot log 16 inches in diameter will saw out about 16×8 or 128 board feet, while a 10-foot long log 14 inches in diameter will cut $\frac{10}{12}$ of 14×7 , or 81 $\frac{1}{3}$ board feet.

It is very important to consider what log rule is to be used, because much depends upon it in measuring and selling timber. There is a great difference in the amount of timber and likely often in the resulting money return.

The International rule (table 5) gives log volumes that closely approximate what can be sawed out by using good methods. Owners of small logs for sale will benefit when this or some equally close rule has come into general use.

TABLE 5.—*International log rule*

[The contents of logs in board feet, by using a circular saw, cutting $\frac{1}{4}$ -inch kerf, and sawing carefully by good methods]

Diameter of log at small end and in- side bark (inches)	Contents of log in board feet when length of log is—												
	8 feet	9 feet	10 feet	11 feet	12 feet	13 feet	14 feet	15 feet	16 feet	17 feet	18 feet	19 feet	20 feet
4	2	2	3	3	4	5	5	5	6	7	7	8	9
5	4	5	6	7	7	8	9	11	12	13	15	16	17
6	7	9	10	11	13	14	16	18	19	21	23	25	27
7	12	14	15	17	19	21	24	26	28	31	34	36	39
8	16	19	21	24	27	30	33	36	39	42	46	49	52
9	23	26	29	33	36	40	43	47	51	55	59	63	68
10	29	33	37	42	45	51	54	59	64	69	75	82	89
11	36	42	46	52	57	63	68	74	80	86	95	100	107
12	44	51	57	62	70	77	83	91	97	103	111	119	129
13	52	60	68	76	83	92	100	108	116	124	134	143	151
14	62	71	80	98	107	107	117	127	136	147	158	168	176
15	73	82	94	104	114	125	136	146	157	170	181	195	204
16	84	96	108	119	131	144	156	167	181	194	207	222	233
17	96	110	123	136	149	163	177	192	205	221	235	251	265
18	110	124	139	155	169	185	201	218	232	250	267	282	300
19	123	140	156	175	190	210	225	244	261	280	299	317	337
20	138	157	174	197	212	232	251	270	290	310	330	352	374
21	152	172	193	215	234	256	279	299	321	344	366	389	412
22	168	192	214	238	259	282	307	330	354	379	404	429	453
23	186	212	235	260	285	310	337	362	388	415	445	470	498
24	203	232	257	285	311	339	367	398	424	452	484	514	543
25	223	253	281	311	339	370	400	433	462	494	526	560	590
26	241	273	304	337	368	402	435	468	502	537	570	606	640
27	262	296	329	364	400	434	471	504	543	580	617	657	692
28	281	319	356	395	432	470	509	545	586	623	664	706	748
29	303	344	383	425	463	505	546	587	630	670	712	756	801
30	326	369	411	455	498	542	586	628	674	719	765	810	858

The Doyle rule (table 6), although very inaccurate for small-sized timber, is probably most commonly used in the United States. To determine the number of board feet in a log by this rule, deduct 4 inches from the diameter of the small end, then square one fourth the remainder and multiply the product by the length in feet.

For example, a log measuring 20 inches at the small end and 12 feet long contains 192 feet. The Doyle rule, in many sections the standard and in some States the legal rule, is unfair to the seller for measuring logs below 28 inches in diameter. In the early days of large cheap timber it was fairly satisfactory, but for small-sized timber it gives such low values as to make it unsatisfactory. The Scribner rule is fairer than the Doyle. Careful sawing, however, should result in 10 to 20 percent more lumber from second-growth timber than is credited by the Scribner rule.

TABLE 6.—*Doyle log rule*

Diameter of log at small end and in- side bark (inches)	Contents of log in board feet when length of log is—												
	6 feet	7 feet	8 feet	9 feet	10 feet	11 feet	12 feet	13 feet	14 feet	15 feet	16 feet	17 feet	18 feet
6	1	2	2	2	3	3	3	3	4	4	4	4	4
7	3	4	4	5	6	7	7	8	8	9	10	10	10
8	6	7	8	9	10	11	12	13	14	15	16	17	18
9	9	11	12	14	16	17	19	20	22	23	25	27	28
10	13	16	18	20	22	25	27	29	31	34	36	38	40
11	18	21	24	28	31	34	37	40	43	46	49	52	55
12	24	28	32	36	40	44	48	52	56	60	64	68	72
13	30	35	40	46	51	56	61	66	71	76	81	86	91
14	37	44	50	56	62	69	75	81	87	94	100	106	112
15	45	53	60	68	76	83	91	98	106	113	121	129	136
16	54	63	72	81	90	99	108	117	126	135	144	153	162
17	63	74	84	95	106	116	127	137	148	158	169	180	190
18	73	86	98	110	122	135	147	159	171	184	196	208	220
19	84	98	112	127	141	155	169	183	197	211	225	239	253
20	96	112	128	144	160	176	192	208	224	240	256	272	288
21	108	126	144	163	181	199	217	235	253	271	289	307	325
22	121	142	162	182	202	223	243	263	283	304	324	344	364
23	135	158	180	203	226	248	271	293	316	338	361	384	406
24	150	175	200	225	250	275	300	325	350	375	400	425	450
25	165	193	220	248	276	303	331	358	386	413	441	469	496
26	181	212	242	272	302	333	363	393	423	454	484	514	544
27	198	231	264	298	331	364	397	430	463	496	529	562	595
28	216	252	288	324	360	396	432	468	504	540	576	612	648
29	234	273	312	352	391	430	469	508	547	586	625	664	702
30	253	296	338	380	422	465	507	549	591	634	676	718	760

In finding a buyer for his timber the owner should inquire of his neighbors who have sold, or at local sawmills, wood yards, wood-using factories, railroad stations, and telegraph and telephone companies. He should also advertise in the papers and write personal letters furnishing a brief description of the kind, quality, and amount of timber for sale, in order to awaken competition among local and outside buyers. Securing a number of bids for the same piece of timber will tend to develop the best market and increase returns. It is well to have a written agreement as to the manner in which the timber shall be cut, and the amount and form of payment² (fig. 8).

Some of the industries buy their supplies largely or wholly in the log; hence, in many cases it will pay the farmer to look up these special markets for his logs, bolts, poles, ties, etc. Industries buying their supplies more or less generally in the form of round timber are manufacturers of handles, cooperage, veneer, woodenware and novelties, shuttles, bobbins and spools, vehicle stock, athletic goods, and pulpwood. Poles are purchased by electric-lighting, power, and tele-

² For further information see Farmers' Bulletin 1210 (price 10 cents), or apply to your State forestry agencies.

phone companies. Markets for piling will be found by applying to railroads, wharf, bridge, and bulkhead contractors in the larger towns and cities. For prices on ties, consult the nearest local railroad station agent. Cordwood is used by brickmakers, bakeries, limekiln operators, and fuel dealers in towns.

FIRE PROTECTION

The forest must be protected. Fire, careless logging, tree diseases, insect pests, and, in the hardwoods, grazing are the principal sources of injury.

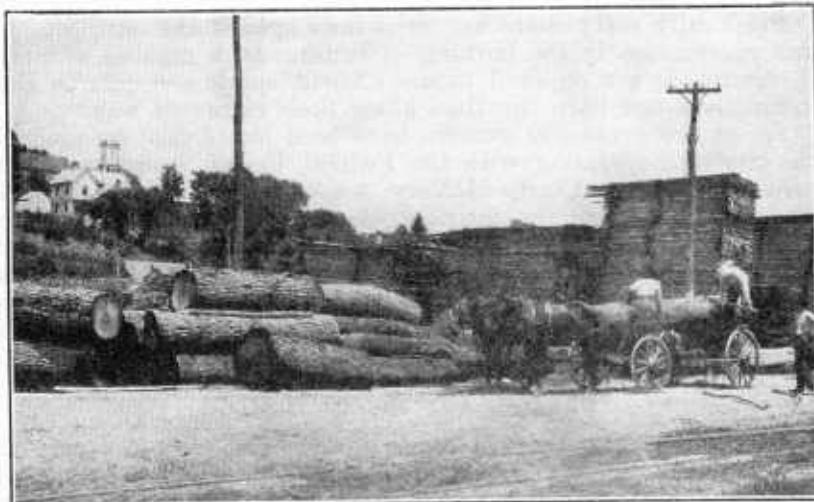


FIGURE 8.—Choice logs bring high prices and are often shipped long distances

Fire kills the little trees and weakens full-grown trees so that they may become diseased or infested with insects. It also destroys the humus cover of leaves and twigs that ordinarily protects the trees against summer drought and heat, conserves water for the springs and streams, and enriches the soil by adding nitrogen.

HELP PREVENT WOODS FIRES

BE SURE your match is out before throwing it away.

DON'T throw away burning tobacco.

CHOOSE a safe place and make your camp fire small.

PUT OUT your fire with water and then cover it with earth.

DON'T make large brush heaps. Choose a still day for burning, and plow furrows to protect near-by woods.

BE CAREFUL WITH FIRE

Dead trees and tops cut in logging are a fire menace and should, if possible, be utilized. Saw logs or firewood can be made out of the dead trees, and the unused large tops should be lopped so that they will lie close to the ground and rot quickly.

Some idea of the prevalence of fires in the United States east of the Rocky Mountains may be formed from the fact that here occur 90 out of every 100 forest fires. For the 5 years of 1926 to 1930, inclusive, an average of 145,448 fires yearly in this region burned over 39,948,304 acres of land and caused an enormous property loss. While fires were reported from all States, a greater number of fires occurred in the southern pine district than in any other important forest region.

Practically every State has strict laws against the setting of fire and carelessness in the burning of brush. In a number of States the railroads are required to use efficient spark arresters in their locomotives and burn fire lines along their rights of way.

Forest fire protective systems have been established by many of the States cooperating with the Federal Forest Service under the provisions of the Clarke-McNary Act. Patrolmen are employed who travel through the districts where there is danger of forest fires, watch for fire, and educate the public in the need for care in preventing fire and for getting quickly to any fire that may occur. Owners of woodland should get in touch with the State foresters and fire patrolmen, and secure their cooperation and assistance in keeping down fire hazard and damage.

GRAZING AND INSECT DAMAGE

Horses and cattle eat and break down young trees and pack the ground hard. Sheep and goats destroy large numbers of small trees by eating them. Hogs root up the ground, digging up the young trees and roots and sometimes eating the roots. They also prevent young trees from starting by devouring the nuts and other seeds from which they grow. On the other hand, however, trees bearing small or unpalatable seeds often start well after hogs have rooted up the leaf litter and soil.

Some people fear that good pasture will be wasted by keeping stock out of the woods. This is hardly true, since a fully stocked woodland has little or no grass in it, for the reason that there is insufficient light (fig. 9). Studies in farm management in northwestern Pennsylvania show that an open stand of trees, such as occur in average wooded pastures, reduces the pasturage value of the land as much as 65 to 70 percent.³ Grass in the woods is a sign that the stand is in poor condition and that the trees are too far apart for growing a good quality and large amount of timber. This does not apply in the southern longleaf pine region or in some of the western forests, where much good timber occurs in open stands. Grass grown under the shade of trees is less nutritious than that grown in the open, so its actual food value is small.

Plenty of shade for livestock should be provided in pastures, but pasture land and woodland are most profitable when managed separately, each for the growing of its own individual product.

³ Agriculture Bulletin 853, *The Organization and Management of Farms in Northwestern Pennsylvania*. (Price 10 cents.)

Woodland may be guarded against serious insect damage and disease by removing dead or dying trees and all those showing signs of insect attack or decay. In the South, pine should be cut in the cool part of the year. When it is cut in the summer, bark beetles and wood borers injure the cut trees, multiply rapidly, and spread to living trees, which they often kill by eating the rich inner bark for food. A special treatment for weevil-infested white pine has been developed. In cases of insect menace or injury it would be best to get into communication with the Bureau of Entomology, United States Department of Agriculture, or the State entomologist.



FIGURE 9.—Little or no grass grows in a fully stocked woodland.

USING TIMBER AT HOME

Lack of knowledge of the proper use of timber is one form of farm mismanagement.

It is a mistake to saw up choice logs of white oak, ash, cherry, and yellow poplar for rough uses at home, or to use clear black walnut for gate boards, or split up white oak butts for fence posts (fig. 10). Many valuable logs go into crossties, when they would bring the owner much more if sold as saw logs. Large numbers of young, rapid-growing trees, producing only one small tie, are cut, which, if left to grow for from 3 to 5 years, would more than double the profit.

Cutting is commonly done promiscuously without regard to continuing the future productiveness of the woodland, and large amounts of timber are commonly wasted in high stumps and long tops.

The importance of the home forest as a reserve for "pinch" times cannot be overestimated. In the period of business reorganization beginning in about 1930, for example, communities and individual farms having local supplies of standing timber were in a favorable condition since lumber, pulpwood, ties, poles, and especially fuel wood, kept moving although in restricted amounts. Farmers with

such supplies also had materials for repair of farm buildings and necessary new construction.

Timber that is cut in the late spring and summer months should be handled with special care to avoid injury. This is because freshly cut wood is then more likely to be attacked by insects and fungi than during the cold part of the year. Seasoning also proceeds more rapidly during the warmer season and may cause excessive checking. If rightly handled, posts, poles, and logs may be cut at any season without their durability being affected. In no case should wood be allowed to lie in direct contact with the ground. The opportunity for insect attack and decay can be reduced to a minimum by peeling



FIGURE 10.—Because they split easily, clear white oak butt logs have been worked up into fence posts when several farmers could have jointly shipped a carload at fancy prices.

the timbers and open-piling them off the ground in a shaded but dry place. This, however, does not retard checking of the wood.

Logs are sometimes stored under water in the hot season to prevent blue stain, checking, insect attack, and decay. Painting the ends of logs with a yellow ocher or barn paint will very materially retard injury by end checking. Painting peeled timbers with creosote will prevent sap stain and decay.

Well-seasoned fuel wood makes more heat and saves time and worry in the home. Thus a woodshed may be a good investment in more ways than in money saving.

TREATING FENCE POSTS

Every farm needs fence posts, but relatively few have sufficient supplies of lasting wood to meet home needs. This is particularly true in the Middle West and South. By means of a simple method of treating timber in open tanks with coal-tar creosote, the post and

pole problem can be readily solved. By this process such short-lived woods as soft maple, beech, birch, sweet gum, black gum, young or sap pine, and red oak are made durable for use in the ground for 10 to 30 years (table 7).

TABLE 7.—*Relative economy of treated and untreated fence posts¹*

	Untreated sap pine	Untreated white or post oak	Creosoted sap pine
Cost of post.....	\$0.05	\$0.21	\$0.08
Cost of treatment.....		.25	
Cost of setting.....	.15	.15	.15
Total cost of post in ground.....	.20	.36	.48
Average life of post.....	2 2	2 6	2 15
Average yearly cost.....	0.10	0.06	0.03½
Average yearly cost of 1 mile of fence (posts 1 rod apart).....	32.00	19.20	10.24

¹ The costs of materials and labor should be regarded as showing relative rather than absolute values.

² Years.

The treating of fence posts is an unusually favorable project for cooperation on the part of several farmers. This refers especially to buying equipment and supplies of coal-tar creosote.

A comparison of the annual costs of maintaining four fences built with posts of untreated sap pines, untreated white or post oak, treated white or post oak, and treated sap pine, respectively, indicates a saving of \$8 to \$23 per mile in favor of the treated pine.

Although more expensive at the outset, creosoted posts are generally more economical to use than many kinds of untreated, short-lived woods, because of their much greater lasting qualities. The exceptions would be in remote localities with cheap wood and labor and where it would be expensive to obtain creosote. The large saving in the replacement charges, which ordinarily mount up so high in maintaining a fence, and the use of cheap and inferior kinds of wood in the first place, much more than offset the increased cost of thorough treatment with creosote (fig. 11). Treated posts are a good investment, and their use where lasting woods are scarce or expensive is a sign of sound judgment in farm management.

Cutting and seasoning.—It is important that the timber be peeled and thoroughly seasoned before an attempt is made to treat it. Small flakes of inner bark left on the wood prevent proper absorption of the preservative at those places. Peeling is done most easily during the spring months, but is carried on at other seasons of the year. The posts to be treated should be peeled from 3 to 4 months, depending upon the weather, before treatment, and open-piled in a dry situation to effect proper seasoning.

Kinds of posts.—Because they have a uniform absorbing surface of sap wood, round sticks are more satisfactory than split timber for treatment. It is not profitable to treat lasting woods, such as red cedar, black locust, chestnut, and white oak. Practically all of the softwoods or sapwoods may be treated and profitably used as posts.

Small-sized timber.—When treated timber is used it is not necessary to cut the large-sized line posts commonly employed untreated in the past. A post from 2 to 3 inches in top diameter, long enough

to allow only a few inches above the top wire, costs less for creosoting and labor in handling, lasts as long as larger-sized timber, and possesses ample strength for ordinary fences. Small-sized trees are abundant in second-growth timber, often being crowded out by more vigorous neighboring trees. Cutting these for fence posts utilizes the forest product that would often otherwise be wasted, improves



FIGURE 11.—The treating of nondurable timber brings many kinds of wood into new forms of utilization. (Photo by courtesy of Iowa State College of Agriculture.)

the remaining stand, and furnishes profitable employment on the farm during slack time.

Kind of treatment.—The application of creosote by brushing over the whole post is only slightly effective in preventing decay, and rot often starts in small cracks which are not reached by the brush, or in checks which soon develop while the post is in use. Open-tank treatment with a hot bath followed by a cold bath is recommended for fence posts. The sapwood surrounding the heartwood takes treatment readily and is thereby protected against the entrance of decay.

Preservative.—It is important to use a good preservative, and coal-tar creosote has been found to be by far the most satisfactory material. Ordinary gas tar or coal tar has been used more or less, but it is usually too thick even when treated to give a fair degree of penetration.

Treating.—The best treatment is that which results in the deepest penetration into the wood with the least absorption of creosote. The butts of the posts should be placed for 1 to 2 hours in creosote heated to a temperature of 180° to 220° F. It is important to treat the wood to a height of a foot above the proposed ground line. In the Southern States the entire post should then be submerged into cold oil, 80° to 100°, for 1 to 2 hours, or for such time as is necessary to get a good penetration. In the North, where decay is less rapid, the cold treatment is applied usually to the butts only, the tops being treated by painting or dipping in creosote.

A satisfactory outfit for treating posts successfully consists of an upright cylindrical tank for the hot treatment and a horizontal rectangular tank for the cold bath.

A saving in cost can be made by two or more farmers joining together in the purchase and use of treating tanks. In a number of instances this has proved to be a successful form of cooperation.

PLANTING FOREST TREES

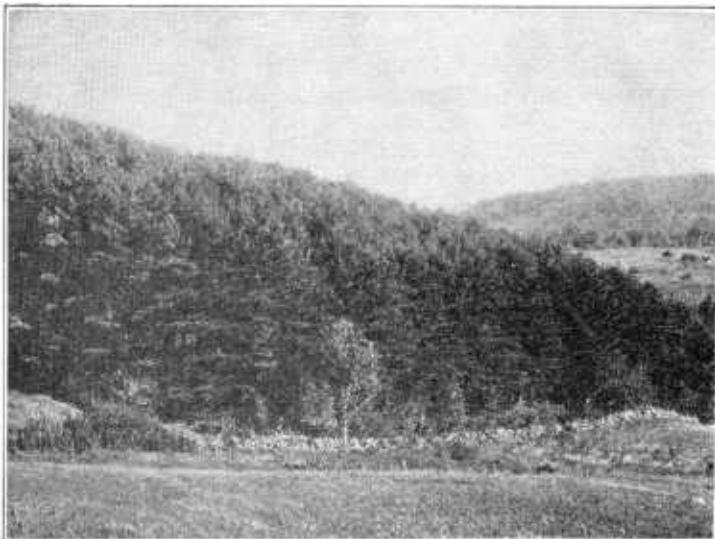
The profitableness of forest planting cannot be laid down by any rule, since it is subject to very wide variation. Rapid-growing trees of good, standard value can often be grown profitably by farmers on portions of worn-out or idle lands or as a commercial enterprise on cheap lands located relatively near good markets. Examples may be cited of white and red pines in New England, black locust and black walnut in many districts of the eastern part of the United States, and shortleaf, loblolly, longleaf, and slash pines in the Southern States.

White pine, especially when planted in mixture with hardwoods, and red pine are among the most promising crops for large areas of the Northeastern States. The largest known reforestation operation undertaken by an individual private landowner is one carried on in the upper portion of the Hudson River in eastern New York, where one owner has planted about 5,500 acres, using a total of 5,473,600 small trees, mostly white, red, and Scotch pines and Norway spruce. In the New England States, New York, New Jersey, Pennsylvania, Michigan, Wisconsin, Minnesota, and elsewhere the white pine blister rust is present, and planters of white pine should protect it from this disease by destroying all wild and cultivated currants and gooseberries within 900 feet of the plantation. These bushes are the alternate hosts of the blister rust and if they are permitted to remain near native or planted white pines in localities where the blister rust is prevalent the trees become diseased and gradually die. Usually the cost of uprooting wild currant and gooseberry bushes is small.⁴

Large areas of fine young forest stands have been established in the South by setting out 1-season-old seedlings of the four important

⁴For further information relative to protection from blister rust consult your State forester or the Bureau of Plant Industry, U.S. Department of Agriculture.

RETURNS IN GROWING TIMBER IN NEW HAMPSHIRE



This white pine was planted on an abandoned sidehill pasture of about 3 acres in New Hampshire. At the age of 44 years (shown in the illustration) it contained about 90,000 board feet of lumber. The total outlay at the time, counting the value of the land and labor of planting, was \$35. The timber was worth on the stump something over \$1,500.

The farmer had this strip of practically worthless sidehill, and with some spare time on hand dug up 1,400 seedling pines growing in a thicket and set them out. About 20 years later the farmer died and among his assets was this small tract of young pine for which, much to her surprise, the widow was offered \$300. The second owner retained it for about 15 years and then, wishing some money, sold it. Soon afterwards it came into the hands of the third owners, a lumber company, for something over \$1,000.

Assuming a land value of \$5 per acre, and a charge for taxes and oversight for the period averaging \$2 per acre per year, the operation yielded a return of 5 percent on the total investment in land, labor, and annual outlay, and in addition a neat sum equivalent to a yearly net profit from the start of \$2.34 per acre. To get this return required favorable markets.

kinds of pines. The largest such young planted forest is located in southeastern Louisiana, where a lumber company has planted 30,000 acres. Hundreds of farmers in the South are turning worn-out farm lands into timber production by planting yearling pines. In the piedmont the pines are mostly the shortleaf and loblolly, and in the lower piedmont and Coastal Plain they are the slash and longleaf pines. Both of the latter trees yield crops of crude turpentine, from which spirits of turpentine and rosin are produced. Owners often say that the return from the "gum" is double that obtained later from the timber.

Of the two trees, the slash pine is more extensively planted because of its very rapid growth when young and its heavy yield of gum or crude turpentine. One farmer in south Georgia has reforested about 2,000 acres of his worn-out cotton fields by planting slash pine seedlings at the rate of about 750 per acre, or a total of 1,500,000 trees.

In rich agricultural belts the planting of forest trees on a large scale for direct money returns would undoubtedly prove to be a losing investment. There, however, considerable forest planting goes on, but on relatively small, isolated tracts on farms and for special purposes, depending upon local conditions. Forest trees are planted chiefly to check soil erosion on slopes; to afford a windbreak as shelter for growing crops, livestock, and man; to produce Christmas trees; and to utilize to the best advantage rough, stony, or poor soils and inaccessible and wet lands. Black walnut is one of the best trees to plant in good soil over much of the region.

In western Tennessee, where the soil is a very deep, rich, clay loam, known locally as "brown loam", the planting of black locust trees has been extensively pushed by the State as a means of reclaiming and making profitable badly eroding lands and at the same time checking at the source of the small streams the silting which results in expensive dredging operations on the Mississippi River and its navigable tributaries. Similar conditions prevail over large areas in other States of the Mississippi Basin and in the piedmont and lower slopes of the Appalachians.

On the farms of the eastern part of the United States many thousands of acres of slopes, from which the forest should never have been removed, have been cleared and have become waste. Careful cutting by the selection method would have resulted in keeping the land continuously productive. This mistake is still going on in some rural sections where foresight and study have not yet been generally applied to farm management.

Forest-tree planting is practicable as a means of putting idle land to producing, checking soil erosion, regulating stream flow, and improving the quality of woodlands by increasing the quantity and value of their product. Through carelessness, cutting, fire, and other agencies, many woodlands have fallen far below their maximum capacity of production. By the application of a little intelligent guidance in making proper improvement cuttings and by affording protection from grazing animals and fire, it is often possible within the period of a few years to bring about a marked change for the better in the composition and quality of the woodland. This method

often succeeds even better than planting trees. This is illustrated by the experience of woodland owners. A progressive farmer in Summit County, Ohio, wishing to handle his woodlands rightly, excluded all livestock by fencing and at the same time planted catalpa in the larger openings in his woods. In 10 years the forest floor, instead of being bare and packed hard, consisted of a deep layer of spongy organic matter, affording protection to the roots of the trees. A complete understory of young yellow or tulip poplars, hard maple, beech, elm, white oak, hickory, and ash had sprung up. The volunteer poplars had grown to from 6 to 12 feet in height and completely overtopped and suppressed the planted catalpa. Inasmuch as the poplars were the more valuable of the two species



FIGURE 12.—Black locust planted on waste land, supplying the farm with fence posts and enriching the soil.

because of their rapid rate of growth and the useful quality of the lumber, nature had beaten the owner at his own game. By making proper thinnings, then, in 5 years the woodland was brought to the very satisfactory condition of having a good stand of valuable species of trees filling all the openings and coming on to take the place of the mature trees as cut.

In choosing species for planting it is always best to consider first the most desirable kinds of native trees, since they are already acclimated to the local conditions and are least subject to failure. In general, the various conifers, including the pines, are to be recommended for planting in most sections of the country because they are quick-growing and yield softwood, which is in more demand than the hardwoods. Cottonwood, which is known for its rapid production of wood, is a good tree for relatively moist situations on good soil. Black locust takes root quickly on dry slopes and possesses to a marked degree the ability to hold the soil against agents of erosion (fig. 12). It is somewhat limited in its range of successful growth by a locust boring beetle, which, however, can be con-

trolled to some extent by means of proper spacing and handling of plantations.⁵ Black walnut is probably one of the best kinds of trees for the farm, owing to the high quality and value of its wood and its production of edible nuts. They should never be planted in close formation but in widely spaced orchards or small groups and only on good agricultural soils.⁶ The more desirable trees for the farm to be favored in planting over a large region of the eastern States include also the red and white pines, European larch and Norway spruce in the northern States, and shortleaf, loblolly, longleaf, and slash pines in the southern States, and yellow (or tulip) poplar and black locust in the eastern uplands and mountains.⁷

The planting of forest trees for shade, nut production, and ornamental purposes, as the original timber becomes scarcer, has a place of increasing importance on our farms and likewise in the towns and cities.

Information regarding the kinds of trees, ways of obtaining seed or seedlings, methods of sowing and planting, and the care of trees can be had upon application to the agricultural county agents, various State forestry agencies, or the Forest Service, United States Department of Agriculture.

The Federal Government is not authorized to distribute stock for forest planting, but under the provisions of the Clarke-McNary law it is cooperating with many of the State forestry departments in the growing and distribution of small trees for planting on farms for timber production or windbreaks.

Next to the improvement of existing woodlands by proper handling and good methods of marketing the products, no branch of farm forestry is of greater importance than forest planting (fig. 13).

ADDITIONAL INFORMATION

Additional information on various phases of forestry or timber farming can be had by writing to your State forestry department at the State capitol or to the extension service, State college of agriculture, or by applying to the county agricultural agent.

Federal publications on farm forestry include the following, which may be had at the prices indicated, in coin or money order, by addressing the Superintendent of Documents, United States Government Printing Office, Washington, D.C.:

Farmers in Northern States Grow Timber as Money Crop. (Farmers' Bulletin 1680). 5 cents.

The Farm Woods, a Savings Bank (Leaflet 29). 5 cents.

Making Woodlands Profitable in the Southern States (Farmers' Bulletin 1071). 5 cents.

Care and Improvement of the Farm Woods (Farmers' Bulletin 1177). 5 cents.

Measuring and Marketing Farm Timber (Farmers' Bulletin 1210). 5 cents.

Sawfly Injurious to Young Pines (Farmers' Bulletin 1259). 5 cents.

Use of Logs and Poles in Farm Construction (Farmers' Bulletin 1660). 5 cents.

⁵ Refer to Farmers' Bulletin 1628, Growing Black Locust Trees. (Price 5 cents.)

⁶ See Leaflet 84, Planting Black Walnut. (Price 5 cents.)

⁷ Much practical information on what to plant and how to plant forest trees is found in Farmers' Bulletin 1123, Growing and Planting Hardwood Seedlings on the Farm (price 5 cents), and Farmers' Bulletin 1453, Growing and Planting Coniferous Trees on the Farm (price 5 cents).

- Production of Maple Sirup and Sugar (Farmers' Bulletin 1366). 5 cents.
 Pulpwood Crops in the Northeast (Leaflet 57). 5 cents.
 More Turpentine, Less Scar, Better Pine (Leaflet 83). 5 cents.
 Small Trees Wasteful to Cut for Saw Timber (Leaflet 55). 5 cents.
 Planting Black Walnut (Leaflet 84). 5 cents.
 Black Walnut for Timber and Nuts (Farmers' Bulletin 1392). 5 cents.
 Growing Black Locust Trees (Farmers' Bulletin 1628). 5 cents.
 Growing and Planting Coniferous Trees on the Farm (Farmers' Bulletin 1453).
 5 cents.
 Growing and Planting Hardwood Seedlings on the Farm (Farmers' Bulletin
 1123). 5 cents.
 Christmas Trees as a Cash Crop for the Farm (Farmers' Bulletin 1664). 5
 cents.



FIGURE 13.—Forest trees needed to check soil érosion and make land bring an income.

- The Windbreak as a Farm Asset (Farmers' Bulletin 1405). 5 cents.
 Planting and Care of Shelter Belts on the Northern Great Plains (Farmers'
 Bulletin 1603). 5 cents.
 Shortleaf Pine (Farmers' Bulletin 1671). 5 cents.
 Loblolly Pine Primer (Farmers' Bulletin 1517). 5 cents.
 Slash Pine (Farmers' Bulletin 1256). 5 cents.
 Longleaf Pine Primer (Farmers' Bulletin 1486). 5 cents.
 Southern Pine Beetle Serious Enemy of Pines in the South (Farmers' Bulletin
 1586). 5 cents.
 Chestnut Blight (Farmers' Bulletin 1641). 5 cents.
 Nut Tree Propagation (Farmers' Bulletin 1501). 10 cents.
 Basket Willow Culture (Farmers' Bulletin 622). 5 cents.
 Trees for Roadside Planting (Farmers' Bulletin 1482). 5 cents.
 Trees for Town and City Streets (Farmers' Bulletin 1208). 5 cents.
 Planting and Care of Street Trees (Farmers' Bulletin 1209). 5 cents.
 Propagation of Trees and Shrubs (Farmers' Bulletin 1567). 5 cents.
 Transplanting Trees and Shrubs (Farmers' Bulletin 1591). 10 cents.
 Pine Tree Treasures (Miscellaneous Publication 106). 5 cents.
 Protect White Pine from Blister Rust (Miscellaneous Publication 22). 5 cents.
 Currants and Gooseberries, their Culture and Relation to Blister Rust (Farm-
 ers' Bulletin 1398). 5 cents.
 The Forest, A Handbook for Teachers (Miscellaneous Circular 98). 10 cents.

FILM STRIPS ON FORESTRY

Film strips on many forestry subjects have been prepared by the Forest Service and Extension Service. These are available by purchase at prices ranging from 50 to 80 cents each, depending upon their length. For further information it is suggested that requests be addressed to the Chief, Forest Service, or Director, Extension Service, United States Department of Agriculture, Washington, D. C. Following are titles of available film strips (35 mm in width):

- Farm Forestry in the South (64 frames).
- Range Management on the National Forests (50 frames).
- Forest Planting in the Northeastern States (39 frames).
- 4-H Forestry Club Work in New Hampshire (46 frames).
- Keeping Livestock out of the Woods in the North Central States (55 frames).
- National-Forest Playgrounds (74 frames).
- The Work of the Forest Service (76 frames).
- Stop Gullies—Save Your Farm (62 frames).
- Forest Conservation (63 frames).
- Forest Fires—How They Are Caused, Their Effects, Detection, and Suppression (77 frames).
- The Dutch Elm Disease in the United States (49 frames) (1936).
- Farm Shelterbelts in the Plains Region (51 frames).
- 4-H Forestry in the United States (60 frames).
- Farm Forestry Extension in the United States (69 frames) (1936).

Lantern slides, in sets, each of about 50 to 70 hand-colored slides and accompanied by a syllabus, or lecture, will be loaned by the Forest Service or the Extension Service (Washington, D. C.) for short periods on condition that borrowers agree to pay transportation charges both ways, to be responsible for slides lost or broken, and to forward the borrowed material promptly and in good condition upon request. Application should be made as far in advance of the need as possible. The subjects upon which slides are available include the following:

- Forestry and agriculture.
- Farm forestry in the South.
- Tree windbreaks.
- Farm woodlands.
- Life of a tree.
- Forest conservation.
- Forestry in the United States.
- The work of the Forest Service.
- Keeping livestock out of the woods in the North Central States.
- National-forest playgrounds.
- Stop gullies—save your farm.
- Forestry and nature study.
- Forestry and manual training.
- Forestry and geography.
- Forest botany.
- Forest fires—how they are caused, their effects, detection, and suppression.
- Famous trees.

Application for lantern slides should be made to the Chief, Forest Service, or the Director, Extension Service, United States Department of Agriculture, Washington, D. C.

FORESTRY INCREASES FARM INCOME

BY

- Making waste lands yield a profit by growing timber on

Poor soils	Wet lands
Steep slopes	Unused corners
Rocky lands	Eroded lands.
 - Furnishing paying employment for men and teams during the winter.
 - Utilizing timber better on the farm and avoiding waste by

Cutting low stumps and small tops,
Using substitute woods in construction,
Treating nonlasting woods.
 - Increasing crop yields by planting forest-tree windbreaks.
 - Growing more and better timber on the farm through

Protecting the woods from fire and overgrazing,
Selecting for cutting the mature, defective, over-crowded, and inferior kinds of trees, and leaving the straight, thrifty, and better kinds,
Planting to fill openings in woods.
 - Marketing the higher grades of wood products direct to consumers at fair prices as

Saw logs	Posts
Poles	Pulpwood
Piling	Firewood
Cooperage bolts	Spoke blocks
Handle bolts	Tannin bark.

MAKE YOUR WOODLAND PERMANENTLY PROFITABLE

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